

Comment on "Sequential Monte Carlo for Bayesian Computation"
(P. Del Moral, A. Doucet, A. Jasra, *Eighth Valencia International Meeting on Bayesian Statistics*)

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The authors added promising innovations in sequential Monte Carlo methodology to the arsenal of the Bayesian community. Most notably, their backward-kernel framework obviates the evaluation of the importance density function, enabling greater flexibility in the choice of algorithms. They also set their work on posterior inference in a more general context by citing results of the observation that particle filters approximate the path integrals studied in theoretical physics (Del Moral 2004).

My first question concerns another recent advance in SMC, the use of the mixture transition kernel

$$\bar{K}_n(\mathbf{x}_{n-1}, \mathbf{x}_n) = \sum_{m=1}^M \bar{\alpha}_{n,m} \kappa_m(\mathbf{x}_{n-1}, \mathbf{x}_n),$$

where $\bar{\alpha}_{n,m}$ equals the sum of normalized weights over all particle values that were drawn from the m th mixture component at time $n-1$, and $\kappa_m(\mathbf{x}_{n-1}, \mathbf{x}_n)$ is an element of the set of M predetermined mixture components (Douc et al. 2006). For example, if the possible transition kernels correspond to Metropolis-Hastings random walk kernels of M different scales chosen by the statistician, then the mixture automatically adapts to the ones most appropriate for the target distribution (Douc et al. 2006). Is there a class of static inference problems for which the backward-kernel approach is better suited, or is it too early to predict which method may perform better in a particular situation?

In his discussion, Carlo Berzuini suggested some opportunities for further SMC research. What areas of mathematical and applied work seem most worthwhile?

I thank the authors for their highly interesting and informative paper.

Reference in Invited Paper

Del Moral, P. (2004) *Feynman-Kac Formulae: Genealogical and Interacting Particle Systems with Applications*, Series: Probability and its Applications, New York: Springer.

Additional Reference

Douc, R., Guillin, A., Marin, J.M., and Robert, C.P. (2006) Convergence of adaptive sampling schemes. *Annals of Statistics* (to appear).